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Sub #25

#21

SEQUENCE LISTING

<110> Brugliera, Filippa
Holton, Timothy A.
Michael, Michael Z.

<120> GENETIC SEQUENCES ENCODING FLAVONOID PATHWAY ENZYMES
AND USES THEREFOR

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 Gly Pro Ile Leu His Leu Arg Leu Gly Phe Val Asp Val Val Val Ala
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 Phe Ala Ser Arg Pro Pro Asn Ser Gly Ala Lys His Met Ala Tyr Asn
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Tyr Gln Asp Leu Val Phe Ala Pro Tyr Gly His Arg Trp Arg Leu Leu
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 Gly Val Phe Asn Ile Gly Asp Phe Val Pro Ser Leu Asp Trp Leu Asp
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 Ala Phe Leu Ser Ser Ile Leu Lys Glu His Glu Met Asn Gly Gln Asp
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Gly Leu Arg Thr Ile Gln Phe Leu Thr Ala Thr Leu Val Gln Gly Phe
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 Phe Ala Val Phe Leu Phe Arg Leu Leu Phe Ser Gly Lys Ser Gln Arg 25

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Asn Leu Pro His Leu Gly Pro Phe Pro His His Ser Ile Ala Glu Leu	
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Ala Lys Lys His Gly Pro Leu Met His Leu Arg Leu Gly Tyr Val Asp	
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Val Val Val Ala Ala Ser Ala Ser Val Ala Ala Gln Phe Leu Lys Thr	
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Arg Arg Val Phe Gly Asp Gly Ser Gly Gly Asp Asp Pro Lys Ala Asp	
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Glu Phe Lys Ser Met Val Val Glu Met Met Val Leu Ala Gly Val Phe	
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Val Asp Met Leu Thr Thr Leu Leu Ser Leu Lys Glu Asp Ala Asp Gly	
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Leu	Ser	Leu	Pro	Arg	Met	Ala	Ala	Glu	Ser	Cys	Glu	Ile	Asn	Gly	Tyr
	370					375					380				
His	Ile	Pro	Lys	Gly	Ser	Thr	Leu	Leu	Val	Asn	Val	Trp	Ala	Ile	Ser
385					390					395					400
Arg	Asp	Pro	Ala	Glu	Trp	Ala	Asp	Pro	Leu	Glu	Phe	Lys	Pro	Glu	Arg
				405					410					415	
Phe	Leu	Pro	Gly	Gly	Glu	Lys	Pro	Asn	Val	Asp	Ile	Arg	Gly	Asn	Asp
			420					425					430		

Phe Glu Val Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Met
 435 440 445
 Ser Leu Gly Leu Arg Met Val His Leu Met Thr Ala Thr Leu Val His
 450 455 460
 Ala Phe Asn Trp Ala Leu Ala Asp Gly Leu Thr Ala Glu Lys Leu Asn
 465 470 475 480
 Met Asp Glu Ala Tyr Gly Leu Thr Leu Gln Arg Ala Ala Pro Leu Met
 485 490 495
 Val His Pro Arg Thr Arg Leu Ala Pro Gln Ala Tyr Lys Thr Ser Ser
 500 505 510
 Ser

<210> 16
 <211> 1660
 <212> DNA
 <213> Chrysanthemum

<220>
 <221> CDS
 <222> (4) .. (1530)

<400> 16
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 Met Thr Ile Leu Ala Phe Val Phe Tyr Ala Leu Ile Leu Gly Ser
 1 5 10 15

 gta ctc tat gta ttt ctt aac tta agt tca cgt aaa tcc gcc aga ctc 96
 Val Leu Tyr Val Phe Leu Asn Leu Ser Ser Arg Lys Ser Ala Arg Leu
 20 25 30

 cca ccc ggg cca aca cca tgg cct ata gtc ggg aac tta cca cac ctt 144
 Pro Pro Gly Pro Thr Pro Trp Pro Ile Val Gly Asn Leu Pro His Leu
 35 40 45

 ggc cca atc cca cac cac gca ctc gcg gcc tta gcc aag aag tac ggg 192
 Gly Pro Ile Pro His His Ala Leu Ala Ala Leu Ala Lys Lys Tyr Gly
 50 55 60

 cca ttg atg cac ctg cgg ctc ggg tgt gtg gac gtg gtt gtg gcc gcg 240
 Pro Leu Met His Leu Arg Leu Gly Cys Val Asp Val Val Val Ala Ala
 65 70 75

 tct gct tcc gta gct gca cag ttt tta aaa gtt cac gac gca aat ttt 288
 Ser Ala Ser Val Ala Ala Gln Phe Leu Lys Val His Asp Ala Asn Phe
 80 85 90 95

 gct agt agg ccg cca aat tct ggc gcg aaa cat gtg gcg tat aat tat 336
 Ala Ser Arg Pro Pro Asn Ser Gly Ala Lys His Val Ala Tyr Asn Tyr
 100 105 110

 cag gat ctt gtg ttt gca cct tat ggt cca agg tgg cgt ttg tta agg 384
 Gln Asp Leu Val Phe Ala Pro Tyr Gly Pro Arg Trp Arg Leu Leu Arg
 115 120 125

 aag att tgt tcg gtc cat ttg ttt tct gct aaa gca ctt gat gat ttt 432
 Lys Ile Cys Ser Val His Leu Phe Ser Ala Lys Ala Leu Asp Asp Phe
 130 135 140

 cgt cat gtt cga cag gag gag gta gca gtc cta acc cgc gta cta ctg 480
 Arg His Val Arg Gln Glu Glu Val Ala Val Leu Thr Arg Val Leu Leu
 145 150 155

agt gct gga aac tca ccg gta cag ctt ggc caa cta ctt aac gtg tgt	528
Ser Ala Gly Asn Ser Pro Val Gln Leu Gly Gln Leu Leu Asn Val Cys	
160 165 170 175	
gcc aca aac gcc tta gca cgg gta atg tta ggt agg aga gtt ttc gga	576
Ala Thr Asn Ala Leu Ala Arg Val Met Leu Gly Arg Arg Val Phe Gly	
180 185 190	
gac gga att gac agg tca gcc aat gag ttc aaa gat atg gta gta gag	624
Asp Gly Ile Asp Arg Ser Ala Asn Glu Phe Lys Asp Met Val Val Glu	
195 200 205	
tta atg gta tta gca gga gaa ttt aac ctt ggt gac ttt att cct gta	672
Leu Met Val Leu Ala Gly Glu Phe Asn Leu Gly Asp Phe Ile Pro Val	
210 215 220	
ctt gac cta ttc gac cta caa ggc att act aaa aaa atg aag aag ctt	720
Leu Asp Leu Phe Asp Leu Gln Gly Ile Thr Lys Lys Met Lys Lys Leu	
225 230 235	
cat gtt cgg ttc gat tca ttt ctt agt aag atc gtt gag gag cat aaa	768
His Val Arg Phe Asp Ser Phe Leu Ser Lys Ile Val Glu Glu His Lys	
240 245 250 255	
acg gca cct ggt ggg ttg ggt cat act gat ttg ctg agc acg ttg att	816
Thr Ala Pro Gly Gly Leu Gly His Thr Asp Leu Leu Ser Thr Leu Ile	
260 265 270	
tca ctt aaa gat gat gct gat att gaa ggt ggg aag ctt aca gat act	864
Ser Leu Lys Asp Asp Ala Asp Ile Glu Gly Gly Lys Leu Thr Asp Thr	
275 280 285	
gaa atc aaa gct ttg ctt ctg aat tta ttc gct gcg gga aca gac aca	912
Glu Ile Lys Ala Leu Leu Leu Asn Leu Phe Ala Ala Gly Thr Asp Thr	
290 295 300	
tcc tct agt aca gta gaa tgg gca ata gcc gaa ctc att cgt cat cca	960
Ser Ser Ser Thr Val Glu Trp Ala Ile Ala Glu Leu Ile Arg His Pro	
305 310 315	
caa ata tta aaa caa gcc cga gaa gag ata gac gct gta gtt ggt caa	1008
Gln Ile Leu Lys Gln Ala Arg Glu Glu Ile Asp Ala Val Val Gly Gln	
320 325 330 335	
gac cgg ctt gta aca gaa ttg gac ttg agc caa cta aca tac ctc cag	1056
Asp Arg Leu Val Thr Glu Leu Asp Leu Ser Gln Leu Thr Tyr Leu Gln	
340 345 350	
gct ctt gtg aaa gag gtg ttt agg ctc cac cct tca acg cca ctc tcc	1104
Ala Leu Val Lys Glu Val Phe Arg Leu His Pro Ser Thr Pro Leu Ser	
355 360 365	
tta cca aga ata tca tcc gag agt tgt gag gtc gat ggg tat tat atc	1152
Leu Pro Arg Ile Ser Ser Glu Ser Cys Glu Val Asp Gly Tyr Tyr Ile	
370 375 380	
cct aag gga tcc aca ctc ctc gtt aac gtg tgg gcc att gcg cga gac	1200
Pro Lys Gly Ser Thr Leu Leu Val Asn Val Trp Ala Ile Ala Arg Asp	
385 390 395	
cca aaa atg tgg gcg gat cct ctt gaa ttt agg cct tct cgg ttt tta	1248
Pro Lys Met Trp Ala Asp Pro Leu Glu Phe Arg Pro Ser Arg Phe Leu	
400 405 410 415	

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ccc ggg gga gaa aag ccc ggt gct gat gtt agg gga aat gat ttt gaa 1296
Pro Gly Gly Glu Lys Pro Gly Ala Asp Val Arg Gly Asn Asp Phe Glu
      420      425      430

ggt ata cca ttt ggg gca gga cga agg att tgt gcg ggt atg agc cta 1344
Val Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Met Ser Leu
      435      440      445

ggc ttg aga atg gtc cag ttg ctc att gca aca ttg gtc caa act ttt 1392
Gly Leu Arg Met Val Gln Leu Leu Ile Ala Thr Leu Val Gln Thr Phe
      450      455      460

gat tgg gaa ctg gct aac ggg tta gag ccg gag atg ctc aac atg gaa 1440
Asp Trp Glu Leu Ala Asn Gly Leu Glu Pro Glu Met Leu Asn Met Glu
      465      470      475

gaa gcg tat gga ttg acc ctt caa cgg gct gca ccc ttg atg gtt cac 1488
Glu Ala Tyr Gly Leu Thr Leu Gln Arg Ala Ala Pro Leu Met Val His
480      485      490      495

ccg aag ccg agg tta gct ccc cac gta tat gaa agt att taa 1530
Pro Lys Pro Arg Leu Ala Pro His Val Tyr Glu Ser Ile
      500      505

ggactagttt ctcttttgcc tttttgtttc gcaaaggtta atgaataaac gatttcatga 1590

ctcagatagt tatgtaaaca attgtgtttg ctgtttatat atttatctat ttttctagaa 1650

caaaaaaaaaa 1660

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<210> 17
 <211> 508
 <212> PRT
 <213> Chrysanthemum

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<400> 17
Met Thr Ile Leu Ala Phe Val Phe Tyr Ala Leu Ile Leu Gly Ser Val
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Leu Tyr Val Phe Leu Asn Leu Ser Ser Arg Lys Ser Ala Arg Leu Pro
  20      25      30
Pro Gly Pro Thr Pro Trp Pro Ile Val Gly Asn Leu Pro His Leu Gly
  35      40      45
Pro Ile Pro His His Ala Leu Ala Ala Leu Ala Lys Lys Tyr Gly Pro
  50      55      60
Leu Met His Leu Arg Leu Gly Cys Val Asp Val Val Val Ala Ala Ser
  65      70      75      80
Ala Ser Val Ala Ala Gln Phe Leu Lys Val His Asp Ala Asn Phe Ala
  85      90      95
Ser Arg Pro Pro Asn Ser Gly Ala Lys His Val Ala Tyr Asn Tyr Gln
  100     105     110
Asp Leu Val Phe Ala Pro Tyr Gly Pro Arg Trp Arg Leu Leu Arg Lys
  115     120     125
Ile Cys Ser Val His Leu Phe Ser Ala Lys Ala Leu Asp Asp Phe Arg
  130     135     140
His Val Arg Gln Glu Glu Val Ala Val Leu Thr Arg Val Leu Leu Ser
  145     150     155     160
Ala Gly Asn Ser Pro Val Gln Leu Gly Gln Leu Leu Asn Val Cys Ala
  165     170     175
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Thr Asn Ala Leu Ala Arg Val Met Leu Gly Arg Arg Val Phe Gly Asp
  180     185     190
Gly Ile Asp Arg Ser Ala Asn Glu Phe Lys Asp Met Val Val Glu Leu
  195     200     205

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Met Val Leu Ala Gly Glu Phe Asn Leu Gly Asp Phe Ile Pro Val Leu
 210 215 220
 Asp Leu Phe Asp Leu Gln Gly Ile Thr Lys Lys Met Lys Lys Leu His
 225 230 235 240
 Val Arg Phe Asp Ser Phe Leu Ser Lys Ile Val Glu Glu His Lys Thr
 245 250 255

Ala Pro Gly Gly Leu Gly His Thr Asp Leu Leu Ser Thr Leu Ile Ser
 260 265 270
 Leu Lys Asp Asp Ala Asp Ile Glu Gly Gly Lys Leu Thr Asp Thr Glu
 275 280 285
 Ile Lys Ala Leu Leu Leu Asn Leu Phe Ala Ala Gly Thr Asp Thr Ser
 290 295 300
 Ser Ser Thr Val Glu Trp Ala Ile Ala Glu Leu Ile Arg His Pro Gln
 305 310 315 320
 Ile Leu Lys Gln Ala Arg Glu Glu Ile Asp Ala Val Val Gly Gln Asp
 325 330 335
 Arg Leu Val Thr Glu Leu Asp Leu Ser Gln Leu Thr Tyr Leu Gln Ala
 340 345 350
 Leu Val Lys Glu Val Phe Arg Leu His Pro Ser Thr Pro Leu Ser Leu
 355 360 365
 Pro Arg Ile Ser Ser Glu Ser Cys Glu Val Asp Gly Tyr Tyr Ile Pro
 370 375 380
 Lys Gly Ser Thr Leu Leu Val Asn Val Trp Ala Ile Ala Arg Asp Pro
 385 390 395 400
 Lys Met Trp Ala Asp Pro Leu Glu Phe Arg Pro Ser Arg Phe Leu Pro
 405 410 415
 Gly Gly Glu Lys Pro Gly Ala Asp Val Arg Gly Asn Asp Phe Glu Val
 420 425 430
 Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Met Ser Leu Gly
 435 440 445
 Leu Arg Met Val Gln Leu Leu Ile Ala Thr Leu Val Gln Thr Phe Asp
 450 455 460
 Trp Glu Leu Ala Asn Gly Leu Glu Pro Glu Met Leu Asn Met Glu Glu
 465 470 475 480
 Ala Tyr Gly Leu Thr Leu Gln Arg Ala Ala Pro Leu Met Val His Pro
 485 490 495
 Lys Pro Arg Leu Ala Pro His Val Tyr Glu Ser Ile
 500 505

<210> 18
 <211> 1815
 <212> DNA
 <213> Torenia

<220>
 <221> CDS
 <222> (107)..(1633)

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 Met Ser Pro
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tta gcc ttg atg atc ata agt acc tta tta ggg ttt ctc cta tac cac 163
 Leu Ala Leu Met Ile Ile Ser Thr Leu Leu Gly Phe Leu Leu Tyr His
 5 10 15
 tct ctt cgc tta cta ctc ttc tcc ggc caa ggt cgc cga cta cta cca 211

Ser	Leu	Arg	Leu	Leu	Leu	Phe	Ser	Gly	Gln	Gly	Arg	Arg	Leu	Leu	Pro		
20					25					30					35		
cca	ggt	cca	cgc	ccg	tgg	ccg	ctg	gtg	gga	aat	ctc	ccg	cac	tta	ggc	259	
Pro	Gly	Pro	Arg	Pro	Trp	Pro	Leu	Val	Gly	Asn	Leu	Pro	His	Leu	Gly		
				40					45					50			
ccg	aag	cca	cac	gcc	tcc	atg	gcc	gag	ctc	gcg	cga	gcc	tac	gga	ccc	307	
Pro	Lys	Pro	His	Ala	Ser	Met	Ala	Glu	Leu	Ala	Arg	Ala	Tyr	Gly	Pro		
			55					60					65				
ctc	atg	cac	cta	aag	atg	ggg	ttc	gtc	cac	gtc	gtg	gtg	gct	tcg	tcg	355	
Leu	Met	His	Leu	Lys	Met	Gly	Phe	Val	His	Val	Val	Val	Ala	Ser	Ser		
		70					75						80				
gcg	agc	gcg	gcg	gag	cag	tgc	ctg	agg	gtt	cac	gac	gcg	aat	ttc	ttg	403	
Ala	Ser	Ala	Ala	Glu	Gln	Cys	Leu	Arg	Val	His	Asp	Ala	Asn	Phe	Leu		
	85					90					95						
agc	agg	cca	ccc	aac	tcc	ggc	gcc	aag	cac	gtc	gct	tac	aac	tac	gag	451	
Ser	Arg	Pro	Pro	Asn	Ser	Gly	Ala	Lys	His	Val	Ala	Tyr	Asn	Tyr	Glu		
100					105					110					115		
gac	ttg	gtt	ttc	aga	ccg	tac	ggt	ccc	aag	tgg	agg	ctg	ttg	agg	aag	499	
Asp	Leu	Val	Phe	Arg	Pro	Tyr	Gly	Pro	Lys	Trp	Arg	Leu	Leu	Arg	Lys		
				120					125					130			
ata	tgc	gct	cag	cat	att	ttc	tcc	gtc	aag	gct	atg	gat	gac	ttc	agg	547	
Ile	Cys	Ala	Gln	His	Ile	Phe	Ser	Val	Lys	Ala	Met	Asp	Asp	Phe	Arg		
			135					140					145				
cgc	gtc	aga	gag	gaa	gag	gtg	gcc	atc	ctg	agt	cgc	gct	cta	gca	ggc	595	
Arg	Val	Arg	Glu	Glu	Glu	Val	Ala	Ile	Leu	Ser	Arg	Ala	Leu	Ala	Gly		
		150					155					160					
aaa	agg	gcc	gta	ccc	ata	ggc	caa	atg	ctc	aac	gtg	tgc	gcc	aca	aac	643	
Lys	Arg	Ala	Val	Pro	Ile	Gly	Gln	Met	Leu	Asn	Val	Cys	Ala	Thr	Asn		
	165					170					175						
gcc	cta	tct	cgc	gtc	atg	atg	ggg	cgg	cgc	gtg	gtg	ggc	cac	gcg	gat	691	
Ala	Leu	Ser	Arg	Val	Met	Gly	Arg	Arg	Val	Val	Gly	His	Ala	Ala	Asp		
180					185				190						195		
gga	acc	aac	gac	gcc	aag	gcg	gag	gag	ttc	aaa	gcc	atg	gtc	gtc	gag	739	
Gly	Thr	Asn	Asp	Ala	Lys	Ala	Glu	Glu	Phe	Lys	Ala	Met	Val	Val	Glu		
				200					205					210			
ctc	atg	gtc	ctc	tcc	ggc	gtc	ttc	aac	atc	ggt	gat	ttc	atc	ccc	ttc	787	
Leu	Met	Val	Leu	Ser	Gly	Val	Phe	Asn	Ile	Gly	Asp	Phe	Ile	Pro	Phe		
			215					220					225				
ctc	gag	cct	ctc	gac	ttg	cag	gga	gtg	gct	tcc	aag	atg	aag	aaa	ctc	835	
Leu	Glu	Pro	Leu	Asp	Leu	Gln	Gly	Val	Ala	Ser	Lys	Met	Lys	Lys	Leu		
		230					235					240					
cac	gcg	cgg	ttc	gat	gca	ttc	ttg	acc	gag	att	gta	cga	gag	cgt	tgt	883	
His	Ala	Arg	Phe	Asp	Ala	Phe	Leu	Thr	Glu	Ile	Val	Arg	Glu	Arg	Cys		
	245					250					255						
cat	ggg	cag	atc	aac	aac	agt	ggt	gct	cat	cag	gat	gat	ttg	ctt	agc	931	
His	Gly	Gln	Ile	Asn	Asn	Ser	Gly	Ala	His	Gln	Asp	Asp	Leu	Leu	Ser		
260					265					270					275		

acg ttg att tcg ttc aaa ggg ctt gac gat ggc gat ggt tcc agg ctc	979
Thr Leu Ile Ser Phe Lys Gly Leu Asp Asp Gly Asp Gly Ser Arg Leu	
280 285 290	
act gac aca gaa atc aag gcg ctg ctc ttg aac ctt ttg gac acg acg	1027
Thr Asp Thr Glu Ile Lys Ala Leu Leu Leu Asn Leu Leu Asp Thr Thr	
295 300 305	
tcg agc acg gtg gaa tgg gcc gta gcc gaa ctc cta cgc cac cct aag	1075
Ser Ser Thr Val Glu Trp Ala Val Ala Glu Leu Leu Arg His Pro Lys	
310 315 320	
aca tta gcc caa gtc cgg caa gag ctc gac tcg gtc gtg ggt aag aac	1123
Thr Leu Ala Gln Val Arg Gln Glu Leu Asp Ser Val Val Gly Lys Asn	
325 330 335	
agg ctc gtg tcc gag acc gat ctg aat cag ctg ccc tat cta caa gct	1171
Arg Leu Val Ser Glu Thr Asp Leu Asn Gln Leu Pro Tyr Leu Gln Ala	
340 345 350 355	
gtc gtc aaa gaa act ttc cgc ctc cat cct ccg acg ccg ctc tct cta	1219
Val Val Lys Glu Thr Phe Arg Leu His Pro Pro Thr Pro Leu Ser Leu	
360 365 370	
ccg aga ctc gcg gaa gat gat tgc gag atc gac gga tac ctc atc ccc	1267
Pro Arg Leu Ala Glu Asp Asp Cys Glu Ile Asp Gly Tyr Leu Ile Pro	
375 380 385	
aag ggc tcg acc ctt ctg gtg aac gtt tgg gcc ata gcc cgc gat ccc	1315
Lys Gly Ser Thr Leu Leu Val Asn Val Trp Ala Ile Ala Arg Asp Pro	
390 395 400	
aag gtt tgg gcc gat ccg ttg gag ttt agg ccc gaa cga ttc ttg acg	1363
Lys Val Trp Ala Asp Pro Leu Glu Phe Arg Pro Glu Arg Phe Leu Thr	
405 410 415	
ggc gga gaa aag gcc gac gtc gat gtc aag ggg aac gat ttc gaa gtg	1411
Gly Gly Glu Lys Ala Asp Val Asp Val Lys Gly Asn Asp Phe Glu Val	
420 425 430 435	
ata ccg ttc ggg gcg ggt cgt agg atc tgc gct ggc gtt ggc ttg gga	1459
Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Val Gly Leu Gly	
440 445 450	
ata cgt atg gtc caa ctg ttg acg gcg agt ttg atc cat gca ttc gat	1507
Ile Arg Met Val Gln Leu Leu Thr Ala Ser Leu Ile His Ala Phe Asp	
455 460 465	
ctg gac ctt gct aat ggg ctt ttg gcc caa aat ctg aac atg gaa gaa	1555
Leu Asp Leu Ala Asn Gly Leu Leu Ala Gln Asn Leu Asn Met Glu Glu	
470 475 480	
gca tat ggg ctt acg cta caa cgg gct gag cct ttg ttg gtc cac cct	1603
Ala Tyr Gly Leu Thr Leu Gln Arg Ala Glu Pro Leu Leu Val His Pro	
485 490 495	
agg ccg cgg ttg gcc act cat gtc tat taa ttaaattagg cctaaactac	1653
Arg Pro Arg Leu Ala Thr His Val Tyr	
500 505	

gatgaatgac ccatttaacg ttaataagag ttttcaattt atgtgagttt gcatggatatg 1713

gtatggatatg gtgcttgtaa taaattgtat ctgttaggtg tgttcattga tgataaatct 1773

agtttgtact gctgctcaaa aaaaaaaaaa aaaaaaaaaa aa

1815

<210> 19
 <211> 508
 <212> PRT
 <213> Torenia

<400> 19
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 Leu Tyr His Ser Leu Arg Leu Leu Leu Phe Ser Gly Gln Gly Arg Arg
 20 25 30
 Leu Leu Pro Pro Gly Pro Arg Pro Trp Pro Leu Val Gly Asn Leu Pro
 35 40 45
 His Leu Gly Pro Lys Pro His Ala Ser Met Ala Glu Leu Ala Arg Ala
 50 55 60
 Tyr Gly Pro Leu Met His Leu Lys Met Gly Phe Val His Val Val Val
 65 70 75 80
 Ala Ser Ser Ala Ser Ala Ala Glu Gln Cys Leu Arg Val His Asp Ala
 85 90 95
 Asn Phe Leu Ser Arg Pro Pro Asn Ser Gly Ala Lys His Val Ala Tyr
 100 105 110
 Asn Tyr Glu Asp Leu Val Phe Arg Pro Tyr Gly Pro Lys Trp Arg Leu
 115 120 125
 Leu Arg Lys Ile Cys Ala Gln His Ile Phe Ser Val Lys Ala Met Asp
 130 135 140
 Asp Phe Arg Arg Val Arg Glu Glu Glu Val Ala Ile Leu Ser Arg Ala
 145 150 155 160
 Leu Ala Gly Lys Arg Ala Val Pro Ile Gly Gln Met Leu Asn Val Cys
 165 170 175
 Ala Thr Asn Ala Leu Ser Arg Val Met Met Gly Arg Arg Val Val Gly
 180 185 190
 His Ala Asp Gly Thr Asn Asp Ala Lys Ala Glu Glu Phe Lys Ala Met
 195 200 205
 Val Val Glu Leu Met Val Leu Ser Gly Val Phe Asn Ile Gly Asp Phe
 210 215 220
 Ile Pro Phe Leu Glu Pro Leu Asp Leu Gln Gly Val Ala Ser Lys Met
 225 230 235 240
 Lys Lys Leu His Ala Arg Phe Asp Ala Phe Leu Thr Glu Ile Val Arg
 245 250 255
 Glu Arg Cys His Gly Gln Ile Asn Asn Ser Gly Ala His Gln Asp Asp
 260 265 270
 Leu Leu Ser Thr Leu Ile Ser Phe Lys Gly Leu Asp Asp Gly Asp Gly
 275 280 285
 Ser Arg Leu Thr Asp Thr Glu Ile Lys Ala Leu Leu Leu Asn Leu Leu
 290 295 300
 Asp Thr Thr Ser Ser Thr Val Glu Trp Ala Val Ala Glu Leu Leu Arg
 305 310 315 320
 His Pro Lys Thr Leu Ala Gln Val Arg Gln Glu Leu Asp Ser Val Val
 325 330 335
 Gly Lys Asn Arg Leu Val Ser Glu Thr Asp Leu Asn Gln Leu Pro Tyr
 340 345 350
 Leu Gln Ala Val Val Lys Glu Thr Phe Arg Leu His Pro Pro Thr Pro
 355 360 365
 Leu Ser Leu Pro Arg Leu Ala Glu Asp Asp Cys Glu Ile Asp Gly Tyr
 370 375 380
 Leu Ile Pro Lys Gly Ser Thr Leu Leu Val Asn Val Trp Ala Ile Ala
 385 390 395 400
 Arg Asp Pro Lys Val Trp Ala Asp Pro Leu Glu Phe Arg Pro Glu Arg
 405 410 415
 Phe Leu Thr Gly Gly Glu Lys Ala Asp Val Asp Val Lys Gly Asn Asp
 420 425 430

Phe Glu Val Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Val
 435 440 445
 Gly Leu Gly Ile Arg Met Val Gln Leu Leu Thr Ala Ser Leu Ile His
 450 455 460
 Ala Phe Asp Leu Asp Leu Ala Asn Gly Leu Leu Ala Gln Asn Leu Asn
 465 470 475 480
 Met Glu Glu Ala Tyr Gly Leu Thr Leu Gln Arg Ala Glu Pro Leu Leu
 485 490 495
 Val His Pro Arg Pro Arg Leu Ala Thr His Val Tyr
 500 505

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 <211> 1824
 <212> DNA
 <213> Jap. Morning Glory

<220>
 <221> CDS
 <222> (2)..(1555)

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 ttt ctt att ctg agg gtg aaa cag cgt tac cct tta cct ctg cca ccc 97
 Phe Leu Ile Leu Arg Val Lys Gln Arg Tyr Pro Leu Pro Leu Pro Pro
 20 25 30

 gga cca aaa cca tgg ccg gtg tta gga aac ctt ccc cac ctg ggc aag 145
 Gly Pro Lys Pro Trp Pro Val Leu Gly Asn Leu Pro His Leu Gly Lys
 35 40 45

 aag cct cac cag tgc att gcg gcc atg gct gag agg tac ggc ccc ctg 193
 Lys Pro His Gln Ser Ile Ala Ala Met Ala Glu Arg Tyr Gly Pro Leu
 50 55 60

 atg cac ctg cgc cta gga ttc gtg gac gtg gtt gtg gcc gcc tcc gcc 241
 Met His Leu Arg Leu Gly Phe Val Asp Val Val Val Ala Ala Ser Ala
 65 70 75 80

 gcc gtg gcc gct cag ttc ttg aaa gtt cac gac tgc aac ttc tcc aac 289
 Ala Val Ala Ala Gln Phe Leu Lys Val His Asp Ser Asn Phe Ser Asn
 85 90 95

 cgg ccg ccg aac tcc ggc gcg gaa cac att gct tat aac tat caa gac 337
 Arg Pro Pro Asn Ser Gly Ala Glu His Ile Ala Tyr Asn Tyr Gln Asp
 100 105 110

 ctg gtc ttc gcg ccc tac ggc ccg cgg tgg cgc atg ctt agg aag atc 385
 Leu Val Phe Ala Pro Tyr Gly Pro Arg Trp Arg Met Leu Arg Lys Ile
 115 120 125

 acc tcc gtg cat ctg ttc tgc gcc aag gcg ttg gat gac ttc tgc cat 433
 Thr Ser Val His Leu Phe Ser Ala Lys Ala Leu Asp Asp Phe Cys His
 130 135 140

 gtt cgc cag gaa gag gtt gca act ctg aca cgc agt cta gca agt gca 481
 Val Arg Gln Glu Glu Val Ala Thr Leu Thr Arg Ser Leu Ala Ser Ala
 145 150 155 160

 ggc aaa act cca gta aaa cta ggg cag tta cta aac gtg tgc acc acg 529

Gly	Lys	Thr	Pro	Val 165	Lys	Leu	Gly	Gln	Leu 170	Leu	Asn	Val	Cys	Thr 175	Thr		
aac	gcc	cta	gct	cgt	gta	atg	cta	ggg	cgg	aag	gtc	ttt	aat	gac	gga	577	
Asn	Ala	Leu	Ala	Arg	Val	Met	Leu	Gly	Arg	Lys	Val	Phe	Asn	Asp	Gly		
			180					185					190				
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Glu	Met	Met	Val	Leu	Ala	Gly	Ser	Phe	Asn	Ile	Gly	Asp	Phe	Ile	Pro		
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Lys	Cys	Val	Asn	Asn	Gln	His	Thr	Thr	Leu	Ser	Lys	Asp	Val	Asp	Phe		
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Glu	Glu	Gly	Lys	Leu	Thr	Asp	Thr	Glu	Ile	Lys	Ala	Leu	Leu	Leu	Asn		
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Ile	Ala	Glu	Leu	Leu	Arg	Asn	Pro	Lys	Ile	Leu	Asn	Gln	Ala	Gln	Gln		
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Leu	Thr	Asp	Leu	Pro	Phe	Leu	Gln	Ala	Ile	Val	Lys	Glu	Thr	Phe	Arg		
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Cys	Glu	Ile	Asn	Gly	Tyr	Phe	Ile	Pro	Lys	Gly	Ala	Thr	Leu	Leu	Val		
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Asn	Val	Trp	Ala	Ile	Ala	Arg	Asp	Pro	Asn	Val	Trp	Thr	Asn	Pro	Leu		
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Glu Phe Asn Pro His Arg Phe Leu Pro Gly Gly Glu Lys Pro Asn Val
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 Asp Ile Lys Gly Asn Asp Phe Glu Val Ile Pro Phe Gly Ala Gly Arg
 435 440 445
 aga ata tgc tct ggg atg agt ttg ggg ata agg atg gtt cac ctg ttg 1393
 Arg Ile Cys Ser Gly Met Ser Leu Gly Ile Arg Met Val His Leu Leu
 450 455 460
 gtt gca act ttg gtg cat gct ttt gat tgg gat ttg gtg aat gga caa 1441
 Val Ala Thr Leu Val His Ala Phe Asp Trp Asp Leu Val Asn Gly Gln
 465 470 475 480
 tct gta gag acg ctc aat atg gag gaa gct tat ggt ctc acc ctt caa 1489
 Ser Val Glu Thr Leu Asn Met Glu Glu Ala Tyr Gly Leu Thr Leu Gln
 485 490 495
 cga gct gtt cct ttg atg ttg cat cca aag ccc aga tta caa cca cat 1537
 Arg Ala Val Pro Leu Met Leu His Pro Lys Pro Arg Leu Gln Pro His
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 Leu Tyr Thr Leu Asn
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 aaaggaaaac tggttgtatt caattccgct aggccttgct cgaaagacct catgaagact 1765
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 Gly Pro Lys Pro Trp Pro Val Leu Gly Asn Leu Pro His Leu Gly Lys
 35 40 45
 Lys Pro His Gln Ser Ile Ala Ala Met Ala Glu Arg Tyr Gly Pro Leu
 50 55 60
 Met His Leu Arg Leu Gly Phe Val Asp Val Val Ala Ala Ser Ala
 65 70 75 80
 Ala Val Ala Ala Gln Phe Leu Lys Val His Asp Ser Asn Phe Ser Asn
 85 90 95
 Arg Pro Pro Asn Ser Gly Ala Glu His Ile Ala Tyr Asn Tyr Gln Asp
 100 105 110
 Leu Val Phe Ala Pro Tyr Gly Pro Arg Trp Arg Met Leu Arg Lys Ile
 115 120 125
 Thr Ser Val His Leu Phe Ser Ala Lys Ala Leu Asp Asp Phe Cys His
 130 135 140
 Val Arg Gln Glu Glu Val Ala Thr Leu Thr Arg Ser Leu Ala Ser Ala
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Gly Lys Thr Pro Val Lys Leu Gly Gln Leu Leu Asn Val Cys Thr Thr
 165 170 175
 Asn Ala Leu Ala Arg Val Met Leu Gly Arg Lys Val Phe Asn Asp Gly
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 Gly Ser Lys Ser Asp Pro Lys Ala Glu Glu Phe Lys Ser Met Val Glu
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 Glu Met Met Val Leu Ala Gly Ser Phe Asn Ile Gly Asp Phe Ile Pro
 210 215 220
 Val Leu Gly Trp Phe Asp Val Gln Gly Ile Val Gly Lys Met Lys Lys
 225 230 235 240
 Leu His Ala Arg Phe Asp Ala Phe Leu Asn Thr Ile Leu Glu Glu His
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 Lys Cys Val Asn Asn Gln His Thr Thr Leu Ser Lys Asp Val Asp Phe
 260 265 270
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 275 280 285
 Glu Glu Gly Lys Leu Thr Asp Thr Glu Ile Lys Ala Leu Leu Leu Asn
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 305 310 315 320
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 Glu Leu Asp Leu Val Val Gly Gln Asn Gln Leu Val Thr Glu Ser Asp
 340 345 350
 Leu Thr Asp Leu Pro Phe Leu Gln Ala Ile Val Lys Glu Thr Phe Arg
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 Leu His Pro Ser Thr Pro Leu Ser Leu Pro Arg Met Gly Ala Gln Gly
 370 375 380
 Cys Glu Ile Asn Gly Tyr Phe Ile Pro Lys Gly Ala Thr Leu Leu Val
 385 390 395 400
 Asn Val Trp Ala Ile Ala Arg Asp Pro Asn Val Trp Thr Asn Pro Leu
 405 410 415
 Glu Phe Asn Pro His Arg Phe Leu Pro Gly Gly Glu Lys Pro Asn Val
 420 425 430
 Asp Ile Lys Gly Asn Asp Phe Glu Val Ile Pro Phe Gly Ala Gly Arg
 435 440 445
 Arg Ile Cys Ser Gly Met Ser Leu Gly Ile Arg Met Val His Leu Leu
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 Val Ala Thr Leu Val His Ala Phe Asp Trp Asp Leu Val Asn Gly Gln
 465 470 475 480
 Ser Val Glu Thr Leu Asn Met Glu Glu Ala Tyr Gly Leu Thr Leu Gln
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Gly	Leu	Lys	Asp	Ala	Val	Val	Ala	Ser	Ser	Ala	Ser	Val	Ala	Glu	Gln		
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Phe	Leu	Lys	Lys	His	Asp	Val	Asn	Phe	Ser	Asn	Arg	Pro	Pro	Asn	Ser		
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Tyr	Gly	Pro	Arg	Trp	Arg	Leu	Leu	Arg	Lys	Ile	Cys	Ser	Val	His	Leu		
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Ile	Cys	Ile	Leu	Ile	Arg	Ala	Ile	Ala	Ser	Gly	Gly	His	Ala	Pro	Val		
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His	Ala	Asp	Glu	Phe	Lys	Ser	Met	Val	Val	Glu	Ile	Met	Val	Leu	Ala		
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Lys	Phe	Leu	Asn	Gly	Ile	Leu	Glu	Asp	Arg	Lys	Ser	Asn	Gly	Ser	Asn		
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	225				230					235					240		
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Asp	Ser	Asn	Ile	Asp	Gly	Gly	Asp	Glu	Gly	Thr	Lys	Leu	Thr	Asp	Thr		
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Glu	Ile	Lys	Ala	Leu	Leu	Leu	Asn	Leu	Phe	Ile	Ala	Gly	Thr	Asp	Thr		
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Asn	Arg	Phe	Val	Thr	Glu	Ser	Asp	Leu	Pro	Gln	Leu	Thr	Phe	Leu	Gln		
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gcc	gtc	atc	aaa	gag	act	ttc	agg	ctt	cat	cca	tcc	acc	cca	ctc	tct	1008	
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Leu	Pro	Arg	Met	Ala	Ala	Glu	Asp	Cys	Glu	Ile	Asn	Gly	Tyr	Tyr	Val		
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Ser	Glu	Gly	Ser	Thr	Leu	Leu	Val	Asn	Val	Trp	Ala	Ile	Ala	Arg	Asp		
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Pro	Asn	Ala	Trp	Ala	Asn	Pro	Leu	Asp	Phe	Asn	Pro	Thr	Arg	Phe	Leu		
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Val	Ile	Pro	Phe	Gly	Ala	Gly	Arg	Arg	Ile	Cys	Ala	Gly	Met	Ser	Leu		
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Asp	Trp	Ala	Leu	Leu	Asp	Gly	Leu	Lys	Pro	Glu	Lys	Leu	Asp	Met	Glu		
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Pro	Lys	Pro	Arg	Leu	Ser	Ala	Gln	Val	Tyr	Cys	Met						
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			405					410					415		
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<400> 24

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Met Leu Gly Arg Arg Val Phe Gly Asp Gly Ser Gly Gly Val Asp Pro
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Gln Ala Asp Glu Phe Lys Ser Met Val Val Glu Ile Met Val Leu Ala
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Gly Ala Phe Asn Leu Gly Asp Phe Ile Pro Ala Leu Asp Trp Phe Asp
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ctg cag gga att acg gca aaa atg aag aaa gtt cac gct cgt ttc gat 289
Leu Gln Gly Ile Thr Ala Lys Met Lys Lys Val His Ala Arg Phe Asp
    85             90             95

gcg ttc tta gac gcg atc ctt gag gag cac aaa tcc aac ggc tct cgc 337
Ala Phe Leu Asp Ala Ile Leu Glu Glu His Lys Ser Asn Gly Ser Arg
    100            105            110

gga gct aag caa cac gtt gac ttg ctg agt atg ttg atc tcc ctt caa 385
Gly Ala Lys Gln His Val Asp Leu Leu Ser Met Leu Ile Ser Leu Gln
    115            120            125

gat aat aac att gat ggt gaa agt ggc gcc aaa ctc act gat aca gaa 433
Asp Asn Asn Ile Asp Gly Glu Ser Gly Ala Lys Leu Thr Asp Thr Glu
    130            135            140

atc aaa gct ttg ctt ctg aac ttg ttc acg gct gga aca gac acg tca 481
Ile Lys Ala Leu Leu Leu Asn Leu Phe Thr Ala Gly Thr Asp Thr Ser
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tca agt act gtg gag tgg gca atc gca gag cta atc cga aac cca gaa 529
Ser Ser Thr Val Glu Trp Ala Ile Ala Glu Leu Ile Arg Asn Pro Glu
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gta ttg gtt caa gcc caa caa gag ctc gat aga gta gtt ggg cca agt 577
Val Leu Val Gln Ala Gln Gln Glu Leu Asp Arg Val Val Gly Pro Ser
    180            185            190

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cgt ctt gtg acc gaa tct gat ctg cct caa ttg gca ttc ctt caa gct 625
Arg Leu Val Thr Glu Ser Asp Leu Pro Gln Leu Ala Phe Leu Gln Ala
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gtc atc aaa gag act ttc aga ctt cat cca tcc act cca ctc tct ctt 673

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Pro	Arg	Met	Ala	Ser	Glu	Gly	Cys	Glu	Ile	Asn	Gly	Tyr	Ser	Ile	Pro		
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Lys	Gly	Ser	Thr	Leu	Leu	Val	Asn	Val	Trp	Ser	Ile	Ala	Arg	Asp	Pro		
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Ser	Ile	Trp	Ala	Asp	Pro	Leu	Glu	Phe	Arg	Pro	Ala	Arg	Phe	Leu	Pro		
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Gly	Gly	Glu	Lys	Pro	Asn	Val	Asp	Val	Arg	Gly	Asn	Asp	Phe	Glu	Val		
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ata	cca	ttt	ggg	gct	gga	cgt	agg	ata	tgt	gct	gga	atg	agc	ttg	ggg	913	
Ile	Pro	Phe	Gly	Ala	Gly	Arg	Arg	Ile	Cys	Ala	Gly	Met	Ser	Leu	Gly		
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tta	aga	atg	ggt	caa	ctt	tcg	aca	gct	act	ttg	ggt	cat	tcg	ttt	aat	961	
Leu	Arg	Met	Val	Gln	Leu	Ser	Thr	Ala	Thr	Leu	Val	His	Ser	Phe	Asn		
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Trp	Asp	Leu	Leu	Asn	Gly	Met	Ser	Pro	Asp	Lys	Leu	Asp	Met	Glu	Glu		
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gct	tat	ggg	ctt	aca	ttg	caa	cgg	gct	tca	cct	ttg	att	gtc	cac	cca	1057	
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Lys	Pro	Arg	Leu	Ala	Ser	Ser	Met	Tyr	Val	Lys							
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tgcgaataat tccttatttta tagcaggaaa tgtcatcttg aattatgtgt aatgtttcttc																	1163
taacttttcga tggaagtgcga aaacaagttt tattaataaaaa aaaaaaaaaa a																	1214

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Met	Leu	Gly	Arg	Arg	Val	Phe	Gly	Asp	Gly	Ser	Gly	Gly	Val	Asp	Pro	
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Gln	Ala	Asp	Glu	Phe	Lys	Ser	Met	Val	Val	Glu	Ile	Met	Val	Leu	Ala	
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 130 135 140
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 Ser Ser Thr Val Glu Trp Ala Ile Ala Glu Leu Ile Arg Asn Pro Glu
 165 170 175
 Val Leu Val Gln Ala Gln Gln Glu Leu Asp Arg Val Val Gly Pro Ser
 180 185 190
 Arg Leu Val Thr Glu Ser Asp Leu Pro Gln Leu Ala Phe Leu Gln Ala
 195 200 205
 Val Ile Lys Glu Thr Phe Arg Leu His Pro Ser Thr Pro Leu Ser Leu
 210 215 220
 Pro Arg Met Ala Ser Glu Gly Cys Glu Ile Asn Gly Tyr Ser Ile Pro
 225 230 235 240
 Lys Gly Ser Thr Leu Leu Val Asn Val Trp Ser Ile Ala Arg Asp Pro
 245 250 255
 Ser Ile Trp Ala Asp Pro Leu Glu Phe Arg Pro Ala Arg Phe Leu Pro
 260 265 270
 Gly Gly Glu Lys Pro Asn Val Asp Val Arg Gly Asn Asp Phe Glu Val
 275 280 285
 Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Met Ser Leu Gly
 290 295 300
 Leu Arg Met Val Gln Leu Ser Thr Ala Thr Leu Val His Ser Phe Asn
 305 310 315 320
 Trp Asp Leu Leu Asn Gly Met Ser Pro Asp Lys Leu Asp Met Glu Glu
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 Lys Pro Arg Leu Ala Ser Ser Met Tyr Val Lys
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ctg gga ctg ttt ttc act tgg ttc ttg gtg aat gga ctc atg tca ctt 103
 Leu Gly Leu Phe Phe Thr Trp Phe Leu Val Asn Gly Leu Met Ser Leu
 10 15 20

cga aga aga aaa atc tct aag aaa ctt cca cca ggt cca ttt cct ttg 151
 Arg Arg Arg Lys Ile Ser Lys Lys Leu Pro Pro Gly Pro Phe Pro Leu
 25 30 35

cct atc atc gga aat ctt cac tta ctt ggt aat cat cct cac aaa tca 199
 Pro Ile Ile Gly Asn Leu His Leu Leu Gly Asn His Pro His Lys Ser
 40 45 50 55

ctt gct caa ctt gca aaa att cat ggt cct att atg aat ctc aaa tta 247
 Leu Ala Gln Leu Ala Lys Ile His Gly Pro Ile Met Asn Leu Lys Leu
 60 65 70

ggc	caa	cta	aac	aca	gtg	gtc	att	tca	tca	tca	gtc	gtg	gca	aga	gaa	295
Gly	Gln	Leu	Asn	Thr	Val	Val	Ile	Ser	Ser	Ser	Val	Val	Ala	Arg	Glu	
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gtc	ttg	caa	aaa	caa	gac	tta	aca	ttt	tcc	aat	agg	ttt	gtc	ccg	gac	343
Val	Leu	Gln	Lys	Gln	Asp	Leu	Thr	Phe	Ser	Asn	Arg	Phe	Val	Pro	Asp	
		90					95					100				
gta	gtc	cat	gtc	cga	aat	cac	tcc	gat	ttt	tct	gtt	gtt	tgg	tta	cca	391
Val	Val	His	Val	Arg	Asn	His	Ser	Asp	Phe	Ser	Val	Val	Trp	Leu	Pro	
	105					110					115					
gtc	aat	tct	cga	tgg	aaa	acg	ctt	cgc	aaa	atc	atg	aac	tct	agc	atc	439
Val	Asn	Ser	Arg	Trp	Lys	Thr	Leu	Arg	Lys	Ile	Met	Asn	Ser	Ser	Ile	
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Phe	Ser	Gly	Asn	Lys	Leu	Asp	Gly	Asn	Gln	His	Leu	Arg	Ser	Lys	Lys	
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gtc	caa	gag	tta	att	gat	tat	tgt	caa	aag	tgt	gcc	aag	aat	ggc	gaa	535
Val	Gln	Glu	Leu	Ile	Asp	Tyr	Cys	Gln	Lys	Cys	Ala	Lys	Asn	Gly	Glu	
			155					160					165			
gca	gtg	gat	ata	gga	aga	gca	act	ttt	gga	act	act	ttg	aat	ttg	cta	583
Ala	Val	Asp	Ile	Gly	Arg	Ala	Thr	Phe	Gly	Thr	Thr	Leu	Asn	Leu	Leu	
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tcc	aac	acc	att	ttc	tct	aaa	gat	ttg	act	aat	ccg	ttt	tct	gat	tct	631
Ser	Asn	Thr	Ile	Phe	Ser	Lys	Asp	Leu	Thr	Asn	Pro	Phe	Ser	Asp	Ser	
	185					190					195					
gct	aaa	gag	ttt	aag	gaa	ttg	gtt	tgg	aac	att	atg	gtt	gag	gct	gga	679
Ala	Lys	Glu	Phe	Lys	Glu	Leu	Val	Trp	Asn	Ile	Met	Val	Glu	Ala	Gly	
200					205					210					215	
aaa	ccc	aat	ttg	gtg	gac	tac	ttt	cct	ttc	ctt	gag	aaa	att	gat	ccg	727
Lys	Pro	Asn	Leu	Val	Asp	Tyr	Phe	Pro	Phe	Leu	Glu	Lys	Ile	Asp	Pro	
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caa	ggt	ata	aag	cga	cgc	atg	act	aat	aat	ttt	act	aag	ttt	ctt	ggc	775
Gln	Gly	Ile	Lys	Arg	Arg	Met	Thr	Asn	Asn	Phe	Thr	Lys	Phe	Leu	Gly	
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ctt	atc	agc	ggt	ttg	att	gat	gac	cgg	tta	aag	gaa	agg	aat	cta	agg	823
Leu	Ile	Ser	Gly	Leu	Ile	Asp	Asp	Arg	Leu	Lys	Glu	Arg	Asn	Leu	Arg	
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Asp	Asn	Ala	Asn	Ile	Asp	Val	Leu	Asp	Ala	Leu	Leu	Asn	Ile	Ser	Gln	
	265					270					275					
gag	aac	cca	gaa	gag	att	gac	agg	aat	caa	atc	gag	cag	ttg	tgt	ctg	919
Glu	Asn	Pro	Glu	Glu	Ile	Asp	Arg	Asn	Gln	Ile	Glu	Gln	Leu	Cys	Leu	
280					285					290					295	
gac	ttg	ttt	gca	gca	ggg	act	gat	act	aca	tcg	aat	acc	ttg	gag	tgg	967
Asp	Leu	Phe	Ala	Ala	Gly	Thr	Asp	Thr	Thr	Ser	Asn	Thr	Leu	Glu	Trp	
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gca	atg	gca	gaa	cta	ctt	cag	aat	cca	cac	aca	ttg	cag	aaa	gca	caa	1015
Ala	Met	Ala	Glu	Leu	Leu	Gln	Asn	Pro	His	Thr	Leu	Gln	Lys	Ala	Gln	
			315					320					325			

gaa gaa ctt gca caa gtc att ggt aaa ggc aaa caa gta gaa gaa gca 1063
 Glu Glu Leu Ala Gln Val Ile Gly Lys Gly Lys Gln Val Glu Glu Ala
 330 335 340
 gat gtt gga cga cta cct tac ttg cga tgc ata gtg aaa gaa acc tta 1111
 Asp Val Gly Arg Leu Pro Tyr Leu Arg Cys Ile Val Lys Glu Thr Leu
 345 350 355
 cga ata cac cca gcg gct cct ctc tta att cca cgt aaa gtg gag gaa 1159
 Arg Ile His Pro Ala Ala Pro Leu Leu Ile Pro Arg Lys Val Glu Glu
 360 365 370 375
 gac gtt gag ttg tct acc tat att att cca aag gat tca caa gtt cta 1207
 Asp Val Glu Leu Ser Thr Tyr Ile Ile Pro Lys Asp Ser Gln Val Leu
 380 385 390
 gtg aac gta tgg gca att gga cgc aac tct gat cta tgg gaa aat cct 1255
 Val Asn Val Trp Ala Ile Gly Arg Asn Ser Asp Leu Trp Glu Asn Pro
 395 400 405
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 Leu Val Phe Lys Pro Glu Arg Phe Trp Glu Ser Glu Ile Asp Ile Arg
 410 415 420
 ggt cga gat ttt gaa ctc att cca ttt ggt gct ggt cga aga att tgc 1351
 Gly Arg Asp Phe Glu Leu Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys
 425 430 435
 cct gga ttg cct ttg gct atg agg atg att cca gta gca cta ggt tca 1399
 Pro Gly Leu Pro Leu Ala Met Arg Met Ile Pro Val Ala Leu Gly Ser
 440 445 450 455
 ttg cta aac tca ttt aat tgg aaa cta tat ggt gga att gca cct aaa 1447
 Leu Leu Asn Ser Phe Asn Trp Lys Leu Tyr Gly Gly Ile Ala Pro Lys
 460 465 470
 gat ttg gac atg cag gaa aag ttt ggc att acc ttg gcg aaa gcc caa 1495
 Asp Leu Asp Met Gln Glu Lys Phe Gly Ile Thr Leu Ala Lys Ala Gln
 475 480 485
 cct ctg cta gct atc cca act ccc ctg tag ctatagggat aaattaagtt 1545
 Pro Leu Leu Ala Ile Pro Thr Pro Leu
 490 495
 gaggttttaa gttactagta gattctattg cagctatagg atttctttca ccatcacgta 1605
 tgctttaccg ttggatgatg gaaagaaata tctatagctt tgggtttggt tagtttgcac 1665
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<220>

<223> Description of Artificial Sequence:oligonucleotide

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18

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<210> 29
<211> 18
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18

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<220>
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<223> n is inosine

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20

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<220>
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<400> 33
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22

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32

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25

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 <213> Petunia sp.

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Gly	Asn	His	Pro	His	Lys	Ser	Leu	Ala	Gln	Leu	Ala	Lys	Ile	His	Gly
	50				55						60				
Pro	Ile	Met	Asn	Leu	Lys	Leu	Gly	Gln	Leu	Asn	Thr	Val	Val	Ile	Ser
	65				70					75					80
Ser	Ser	Val	Val	Ala	Arg	Glu	Val	Leu	Gln	Lys	Gln	Asp	Leu	Thr	Phe
				85					90					95	
Ser	Asn	Arg	Phe	Val	Pro	Asp	Val	Val	His	Val	Arg	Asn	His	Ser	Asp
			100					105					110		
Phe	Ser	Val	Val	Trp	Leu	Pro	Val	Asn	Ser	Arg	Trp	Lys	Thr	Leu	Arg
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	130					135					140				
Gln	His	Leu	Arg	Ser	Lys	Lys	Val	Gln	Glu	Leu	Ile	Asp	Tyr	Cys	Gln
	145				150					155					160
Lys	Cys	Ala	Lys	Asn	Gly	Glu	Ala	Val	Asp	Ile	Gly	Arg	Ala	Thr	Phe
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Gly	Thr	Thr	Leu	Asn	Leu	Leu	Ser	Asn	Thr	Ile	Phe	Ser	Lys	Asp	Leu
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Thr	Asn	Pro	Phe	Ser	Asp	Ser	Ala	Lys	Glu	Phe	Lys	Glu	Leu	Val	Trp
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Phe	Leu	Glu	Lys	Ile	Asp	Pro	Gln	Gly	Ile	Lys	Arg	Arg	Met	Thr	Asn
	225				230					235					240
Asn	Phe	Thr	Lys	Phe	Leu	Gly	Leu	Ile	Ser	Gly	Leu	Ile	Asp	Asp	Arg
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Leu	Lys	Glu	Arg	Asn	Leu	Arg	Asp	Asn	Ala	Asn	Ile	Asp	Val	Leu	Asp
			260					265					270		
Ala	Leu	Leu	Asn	Ile	Ser	Gln	Glu	Asn	Pro	Glu	Glu	Ile	Asp	Arg	Asn
		275					280					285			
Gln	Ile	Glu	Gln	Leu	Cys	Leu	Asp	Leu	Phe	Ala	Ala	Gly	Thr	Asp	Thr
	290					295					300				
Thr	Ser	Asn	Thr	Leu	Glu	Trp	Ala	Met	Ala	Glu	Leu	Leu	Gln	Asn	Pro
					310					315					320
His	Thr	Leu	Gln	Lys	Ala	Gln	Glu	Glu	Leu	Ala	Gln	Val	Ile	Gly	Lys
				325					330					335	
Gly	Lys	Gln	Val	Glu	Glu	Ala	Asp	Val	Gly	Arg	Leu	Pro	Tyr	Leu	Arg
			340					345					350		
Cys	Ile	Val	Lys	Glu	Thr	Leu	Arg	Ile	His	Pro	Ala	Ala	Pro	Leu	Leu
		355					360					365			
Ile	Pro	Arg	Lys	Val	Glu	Glu	Asp	Val	Glu	Leu	Ser	Thr	Tyr	Ile	Ile
		370				375					380				
Pro	Lys	Asp	Ser	Gln	Val	Leu	Val	Asn	Val	Trp	Ala	Ile	Gly	Arg	Asn
					390					395					400
Ser	Asp	Leu	Trp	Glu	Asn	Pro	Leu	Val	Phe	Lys	Pro	Glu	Arg	Phe	Trp
				405					410					415	
Glu	Ser	Glu	Ile	Asp	Ile	Arg	Gly	Arg	Asp	Phe	Glu	Leu	Ile	Pro	Phe
			420					425					430		
Gly	Ala	Gly	Arg	Arg	Ile	Cys	Pro	Gly	Leu	Pro	Leu	Ala	Met	Arg	Met
		435					440					445			
Ile	Pro	Val	Ala	Leu	Gly	Ser	Leu	Leu	Asn	Ser	Phe	Asn	Trp	Lys	Leu
		450				455					460				
Tyr	Gly	Gly	Ile	Ala	Pro	Lys	Asp	Leu	Asp	Met	Gln	Glu	Lys	Phe	Gly
					470				475						480
Ile	Thr	Leu	Ala	Lys	Ala	Gln	Pro	Leu	Leu	Ala	Ile	Pro	Thr	Pro	Leu
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<400> 42

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Ile Leu Arg Ile Phe Ser His Arg Arg Asn Arg Ser His Asn Asn Arg
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Leu Pro Pro Gly Pro Asn Pro Trp Pro Ile Ile Gly Asn Leu Pro His
35 40 45
Met Gly Thr Lys Pro His Arg Thr Leu Ser Ala Met Val Thr Thr Tyr
50 55 60
Gly Pro Ile Leu His Leu Arg Leu Gly Phe Val Asp Val Val Val Ala
65 70 75 80
Ala Ser Lys Ser Val Ala Glu Gln Phe Leu Lys Ile His Asp Ala Asn
85 90 95
Phe Ala Ser Arg Pro Pro Asn Ser Gly Ala Lys His Met Ala Tyr Asn
100 105 110
Tyr Gln Asp Leu Val Phe Ala Pro Tyr Gly His Arg Trp Arg Leu Leu
115 120 125
Arg Lys Ile Ser Ser Val His Leu Phe Ser Ala Lys Ala Leu Glu Asp
130 135 140
Phe Lys His Val Arg Gln Glu Glu Val Gly Thr Leu Thr Arg Glu Leu
145 150 155 160
Val Arg Val Gly Thr Lys Pro Val Asn Leu Gly Gln Leu Val Asn Met
165 170 175
Cys Val Val Asn Ala Leu Gly Arg Glu Met Ile Gly Arg Arg Leu Phe
180 185 190
Gly Ala Asp Ala Asp His Lys Ala Asp Glu Phe Arg Ser Met Val Thr
195 200 205
Glu Met Met Ala Leu Ala Gly Val Phe Asn Ile Gly Asp Phe Val Pro
210 215 220
Ser Leu Asp Trp Leu Asp Leu Gln Gly Val Ala Gly Lys Met Lys Arg
225 230 235 240
Leu His Lys Arg Phe Asp Ala Phe Leu Ser Ser Ile Leu Lys Glu His
245 250 255
Glu Met Asn Gly Gln Asp Gln Lys His Thr Asp Met Leu Ser Thr Leu
260 265 270
Ile Ser Leu Lys Gly Thr Asp Leu Asp Gly Asp Gly Gly Ser Leu Thr
275 280 285
Asp Thr Glu Ile Lys Ala Leu Leu Leu Asn Met Phe Thr Ala Gly Thr
290 295 300
Asp Thr Ser Ala Ser Thr Val Asp Trp Ala Ile Ala Glu Leu Ile Arg
305 310 315 320
His Pro Asp Ile Met Val Lys Ala Gln Glu Glu Leu Asp Ile Val Val
325 330 335

Gly Arg Asp Arg Pro Val Asn Glu Ser Asp Ile Ala Gln Leu Pro Tyr
 340 345 350

 Leu Gln Ala Val Ile Lys Glu Asn Phe Arg Leu His Pro Pro Thr Pro
 355 360 365

 Leu Ser Leu Pro His Ile Ala Ser Glu Ser Cys Glu Ile Asn Gly Tyr
 370 375 380

 His Ile Pro Lys Gly Ser Thr Leu Leu Thr Asn Ile Trp Ala Ile Ala
 385 390 395 400

 Arg Asp Pro Asp Gln Trp Ser Asp Pro Leu Ala Phe Lys Pro Glu Arg
 405 410 415

 Phe Leu Pro Gly Gly Glu Lys Ser Gly Val Asp Val Lys Gly Ser Asp
 420 425 430

 Phe Glu Leu Ile Pro Phe Gly Ala Gly Arg Arg Ile Cys Ala Gly Leu
 435 440 445

 Ser Leu Gly Leu Arg Thr Ile Gln Phe Leu Thr Ala Thr Leu Val Gln
 450 455 460

 Gly Phe Asp Trp Glu Leu Ala Gly Gly Val Thr Pro Glu Lys Leu Asn
 465 470 475 480

 Met Glu Glu Ser Tyr Gly Leu Thr Leu Gln Arg Ala Val Pro Leu Val
 485 490 495

 Val His Pro Lys Pro Arg Leu Ala Pro Asn Val Tyr Gly Leu Gly Ser
 500 505 510

 Gly

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<400> 43
 Arg Pro Pro Asn Ser Gly Ala
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 <223> Xaa cab be any amino acid.

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 <221> UNSURE
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 <223> Xaa can be any amino acid.

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 Leu

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 <211> 521
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 <223> Xaa can be any amino acid. Positions 18-517
 can be 0-500 amino acids.

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 20 25 30

 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 -----100-----105-----110-----

 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 115 120 125

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
	130						135					140			
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
145						150					155				160
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
				165						170				175	
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			180					185					190		
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
		195						200					205		
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
	210						215					220			
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
225						230					235				240
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
				245						250				255	
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			260						265					270	
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
		275						280					285		
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
	290						295					300			
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
305						310					315				320
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
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Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			340						345					350	
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
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	370						375					380			
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385						390					395				400
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
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Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			420						425					430	
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
		435						440					445		
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
	450						455					460			

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
465 470 475 480

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
485 490 495

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
500 505 510

Xaa Xaa Xaa Xaa Xaa Gly Gly Glu Lys
515 520